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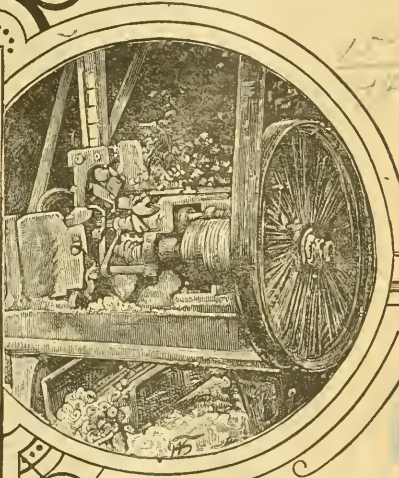
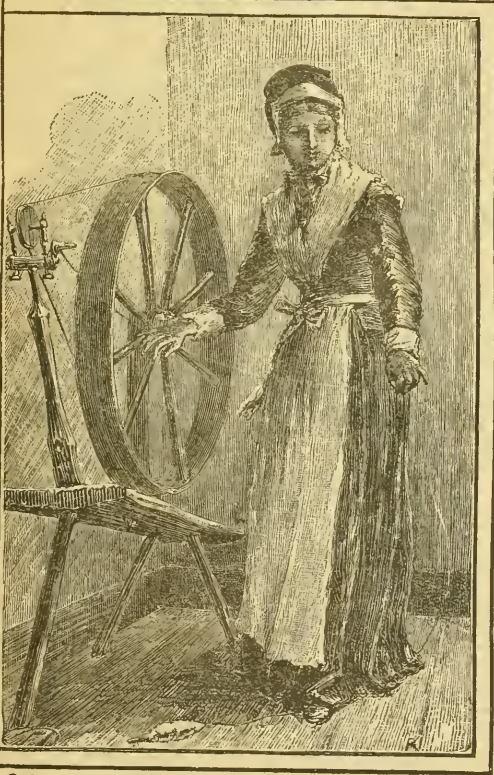








# A Spool OF THREAD



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## & HOW IT IS MADE.

WRITTEN FOR SCRIBNER'S MONTHLY  
BY CHARLES H. CLARK OF THE HARTFORD COURANT.



78797





## A SPOOL OF THREAD.



THE SPINSTER.

IT takes seven million miles of thread to hold the people of the United States in their clothes. If each person has three sets of clothing a year—and certainly that is a low average.—there is created in consequence a yearly demand for more than twenty million miles of this little strand, which, by itself and on the spool, seems so insignificant that it is only by taking an aggregate view that we realize the importance of the thread-making industry. It is one of the oldest occupations of the race; indeed, there is no record of when spinning-wheels began to turn, and the complete story of the development of the fine six-cord spool-cotton of to-day from the old-fashioned hand-made yarn, involves a large part of the romance of human invention and almost the whole history of mechanical progress. It could not be given without a sketch of cotton, in its political as well as physical relations; nor without accounts of the inventions and improvements

of the cotton-gin, the spinning-jenny, the "mule," the water-wheel, the steam-engine, and countless other contrivances for quick and accurate work.

The making of the spool-cotton used in this country is mainly confined to a few large manufactories, for the processes are so elaborate and expensive that it is not possible to conduct the whole business except upon a large scale. There is but one company in America which makes all the numbers of six-cord sewing cotton from the raw material. This is the "Willimantic Linen Company" of Connecticut. Other makers take for their finer numbers cotton yarn, which is spun abroad, and twist it into thread here. The company began business for the manufacture of linen; but the managers, deprived of flax by the breaking out of the Crimean war, turned their attention to cotton thread, and that is now the entire product, though it bears the



ROMAN GIRL WITH DISTAFF

stamp of the original corporate name, and is the Willimantic Linen Company's spool-cotton.

Many visitors to the Centennial Exhibition at Philadelphia will remember the interested crowds that gathered about the exhibit made by the company; and the legend, "America Ahead," with which the award of the judges was announced. The award was the more welcome to Americans because it used to be accepted as a fact that suitable yarn for fine thread could not be spun in the United States. The moisture of Great Britain, especially the atmosphere of Scotland, was declared to be essential for making the yarn properly. But this obstacle—which is not the only one that was met and removed in the business—was finally overcome. A certain amount of moisture in the atmosphere was necessary, and a certain amount of heat; and, as these enter directly into all the calculations of the work, it was absolutely essential to complete success that, being established, they should not vary. Now, the climate does change in New England,—

and got over this serious bar to making thread by first making a climate; and, while the work was being undertaken, instead of imitating the Scotch or any other foreign climate, a perfect and original one was created. Steam heat keeps the air in each room of an even temperature all the time, and escaping steam, rising gently from the floor, moistens the atmosphere to just the necessary extent. More or less of heat or dampness can be had by the turning of a handle; and, right in the middle of a state where snow falls on ripe strawberries and the January thermometer rises to the eighties, there is already one spot that knows no change. In its perpetual evenness, the fibers of cotton are spun into a uniform thread.

Willimantic, where the works of this company are located—the business offices are at Hartford,—is situated upon Willimantic River, about 100 miles from New York and 90 from Boston, on the New York & Boston Air Line Railroad. Two other railroads, the Hartford & Providence and the New London Northern, pass through the place, and

hundreds of their passengers every day catch sight of the great, gray, six-story mills of the thread company, built up of granite quarried out of the very ground on which they stand; and see, too, the rows of neat and comfortable tenements ranged along the streets. There are four large mills, picturesquely set upon the east bank of the river, and stretching, with their surrounding grounds, over a space of three-quarters of a mile. The buildings and grounds are noticeably clean and orderly in appearance. By a series of dams, aided by a sharp natural fall, a force of fifteen hundred horse-power is secured from the river for the factories. In these mills more than a thousand work-people—women and men, and girls and boys—are kept constantly busy at the various labors that combine to make thread. The process is peculiarly clean, clever, and entertaining, and the accuracy and apparent intelligence of the machinery employed put human nature's best endeavors to the blush, until reflection gives

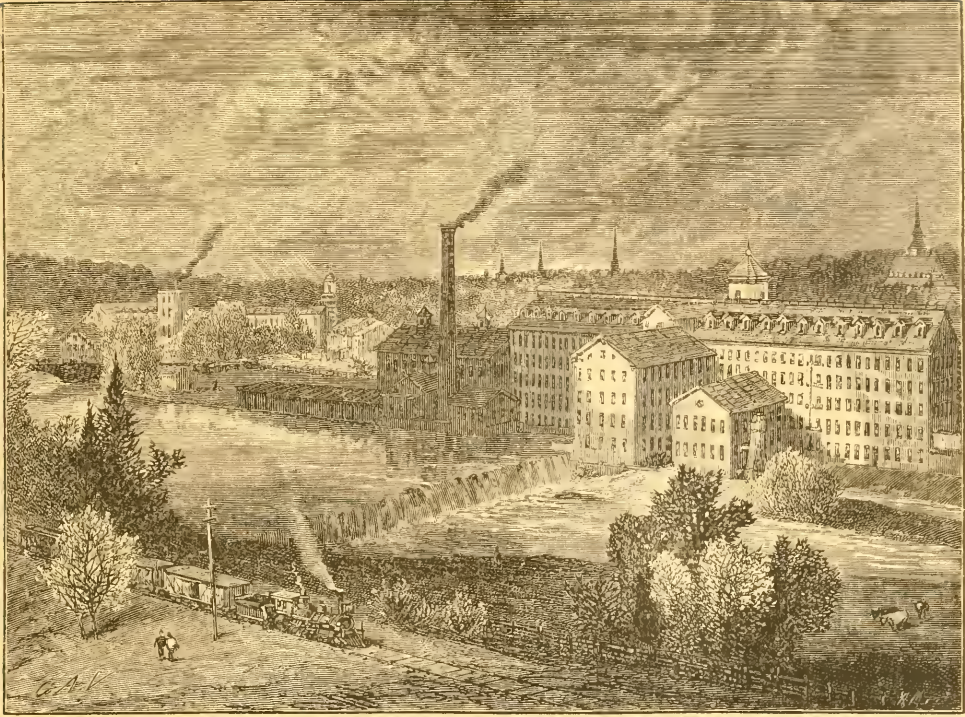


INDIAN GIRL SPINNING.

that is, assuming that there is one there at all,—and the ingenuity which eventually, perhaps, will conquer the whole region, first took up the matter in the Willimantic Mills

the re-assurance that man made the machinery.

There is not room here for, nor have people any inclination to read, technical de-



MILLS OF THE WILLIMANTIC LINEN COMPANY, WILLIMANTIC, CONN.

scriptions of the various machines employed, but a few words as to the difference between the old-time and modern methods of treating cotton and of spinning may be of interest in this connection. (The first attempts at working cotton over were slow and clumsy. To clean out the dirt and seeds from it was a long, difficult work, done, of course, by hand. The cotton was spread out and beaten, and a day's work would not clean enough for a yard of cloth. Now the "picker" cleans about a thousand pounds a day, and needs no attention but to be kept supplied. Carding, which is really combing out the fibers, just as a woman combs her hair, except without a mirror, was all hand work, and then with much time and effort the workmen only partly succeeded in laying the fibers parallel to one another. Now, a carding-machine catches the confused mass that comes from the picker, and smoothes out the strands with an almost fairy-like hand into a gossamer web that is even and clean and nearly light enough to float in air. These filaments, drawn out and worked over by machinery, are finally spun into yarn upon the "mule," that ingenious machine which takes the place of the old-time "spinster,"

and mutely does as much spinning in a day as she could do in ten years, besides doing it better. It has not, however, thrown woman out of work. It has merely changed the nature of her occupation, so that she is now able to give to making clothes the time formerly given to spinning the yarn the clothes were to be made of, and the increase of cleanliness that has come from this cheapening and increase of clothing has been an important factor in improving the physical and moral health of the people.

The term "spinster," by the way, as is probably generally known, comes from the spinning-wheel. This was introduced from India into England in the time of Henry VIII, and spinning became so important and general an element of household work that it gave its name to women to whom that duty fell. The spinning-wheels "came over in the Mayflower," and the women continued to spin here until the English jenny and mule were so perfected as to take away their tiresome but rather picturesque employment. Even now, spinning-wheels are very plenty, and thousands of them, only partly broken down by age and neglect, are stowed away in country garrets

all through the older states. The present revival of the antique and disabled in domestic furniture, and their utter uselessness, have combined to give them a passing pop-



Cotton.



Silk.

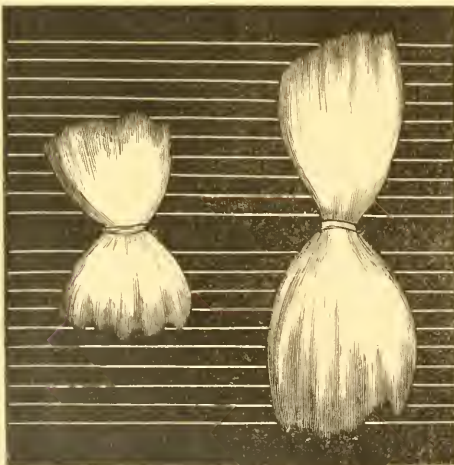


Flax.

COTTON, SILK, AND FLAX (FIBERS MAGNIFIED 1,000 DIAMETERS).

ularity as parlor ornaments. They were used for wool and flax, but the cheapening of cotton by the Whitney gin was the means of superseding them, as there was thus provided something against which domestic competition was useless, while the same principles of spinning machinery, of course, came into play in woolen as in cotton manufacturing. As we have said, woman was promoted from spinning to sewing, and later she has to a great extent ceased to sew, and merely guides the machine that does the work for her. Never, in the history of the world, has she worn so many and such various products of the spinning-wheel and needle as now, showing that the change effected by machinery has been steadily increasing her comfort.

Cotton yarn and cotton fabrics are old to



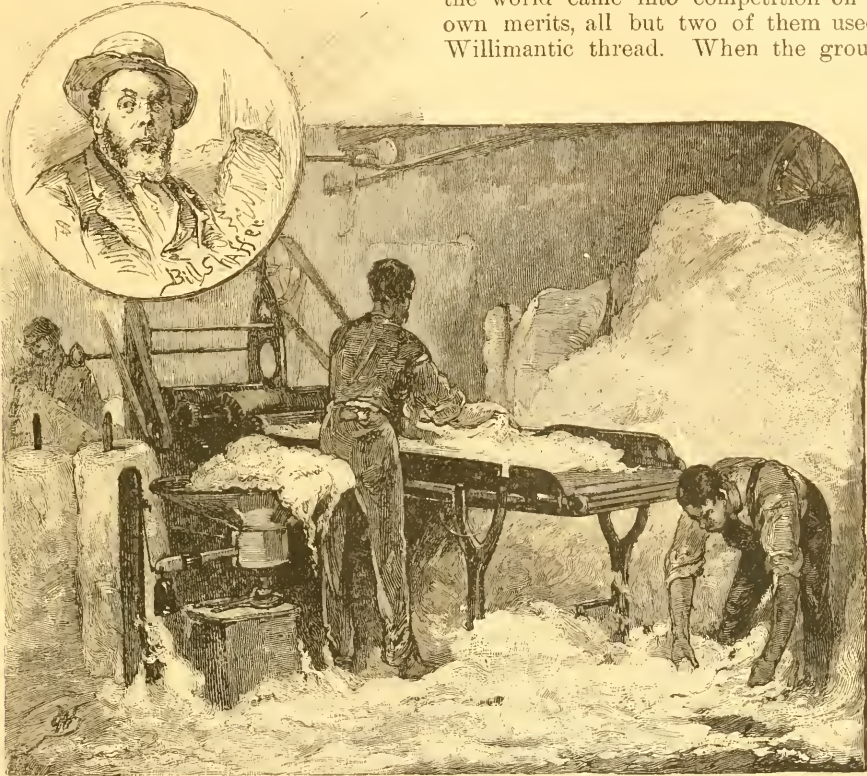
Georgia. Sea Island.  
COTTON STAPLE.—FULL SIZE.

the world. Herodotus told of the vegetable fleeces of India that grew finer than wool, on trees. But it is only recently that sewing-thread of this material has come into use. It was a New England woman who developed the idea. Up to that time people had sewed mainly with linen and silk, but about the beginning of this century Mrs. Samuel Slater of Pawtucket, R. I., while spinning into yarn some of the fine Sea Island cotton, took the notion of making sewing-thread from it, and it proved so very serviceable that it has virtually superseded all other substances for ordinary use. It is cheaper than silk, more pliant than linen, and smoother than wool, and it is stronger than any of them. While it will not lift the same weight to its size that silk or linen will, it is to be remembered that this is not the especial purpose of thread. It is made for holding seams together and to bear a certain strain, to be sure, but especially to withstand the friction that comes of wear; and to-day, if a piece of Willimantic spool-cotton and a piece of silk or linen of the same size be drawn, one against the other, until the weaker is worn out by the rubbing, it will be found that the cotton holds firmer, and finally wears the rival strand in two. This only illustrates the peculiar fitness of the Sea Island cotton for thread-making. It is the best adapted of all fibers for twisting. It does it from force of habit. Each filament of it has a natural twist of a thousand turns to the inch of its length, and is a delicate corkscrew in shape, of such airy lightness that it takes twenty-five hundred fibers, laid side by side, to measure an inch in width. These fibers, called the staple, twist almost of their own accord into a perfect strand, round and compact. The difference between the Sea Island and the ordinary cotton of manufacture—the Georgia or Texas product, for instance—is shown in the cut, which is a careful reproduction from actual full-size copies. Its staple is much longer and finer, and it is only on the Carolina coast islands that this fine staple can be raised. It is in limited supply, and always the most expensive in the market, but the results of its use are so superior to any from the shorter staple, that the addition in cost is compensated by the addition in quality, and in the Willimantic six-cord thread nothing else is used from the coarsest to the finest sizes. This is the only thread all of the numbers of which are made of Sea Island cotton.

The requirements of good thread are that

it shall be smooth and round, and of even size and equal strength. And when it is remembered that each needleful, as drawn off by the seamstress for use, is a test of the whole spool, and any spool is a test of the entire product of the factory where it is

The difference between the living and the automatic seamstress is that the former can get along with an inferior article but the latter cannot, and the best incidental evidence of the success of the Willimantic efforts is found in the fact that at Philadelphia, where all the sewing-machines of the world came into competition on their own merits, all but two of them used the Willimantic thread. When the group of

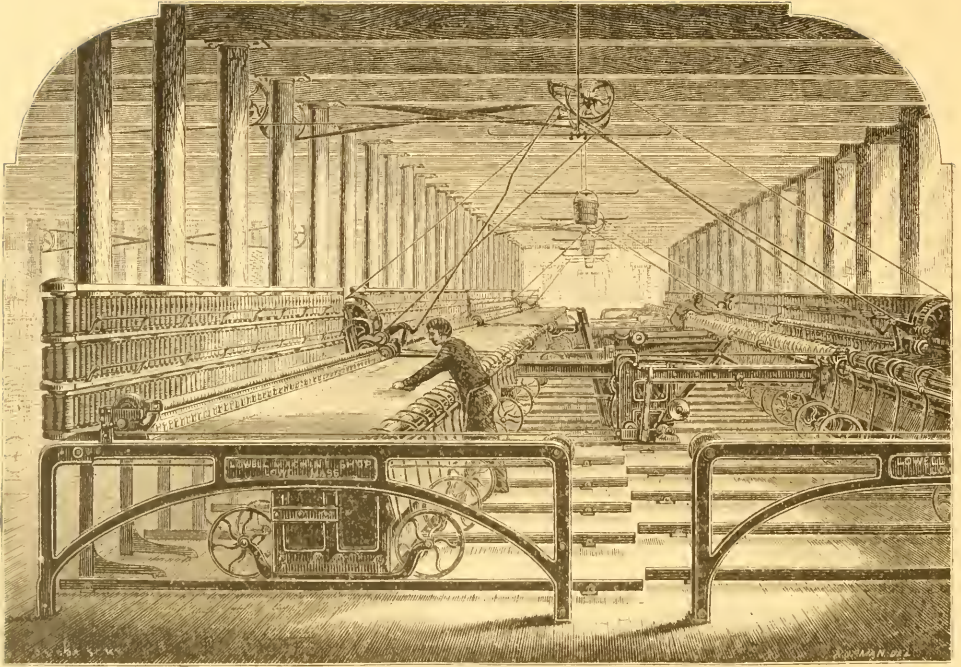


PICKING-ROOM.

made, it will be seen that every yard of the thread is a specimen sample, and that the manufacture is constantly under the closest supervision by consumers. But while hand-sewing, as a matter of convenience and ease, called for an even thread, the introduction and very wide-spread use of the sewing-machine has called for the same qualities as absolutely essential. Sewing-machines take now ninety per cent. of the thread that is made, and in order to do their own work these automatic seamstresses must be satisfied or they summarily strike. It was just as sewing-machines began to come into use that the manufacture of Willimantic thread on an extensive sale began, and the whole bent of the business there has been to supply a proper thread for machine use, since any thread that suits a machine suits anywhere.

judges tested the machines, they tested them all with Willimantic thread. Its peculiar twist and finish are such that it makes a surer and better "loop" for the machine stitch than any other thread.

In the elaborateness of the processes of manufacturing, and in the single devotion to purpose found everywhere, the Willimantic mills show the constant care necessary to maintain the quality of the product. The chief purpose is to secure evenness. From beginning to end the effort is to get a strand so uniform that any two yards of it taken at random will be exactly alike in size and weight, and the working-over of the material for this object is so frequent that each individual fiber of cotton in any spool of this thread has traveled over more than three thousand miles of space



MULE SPINNERS.

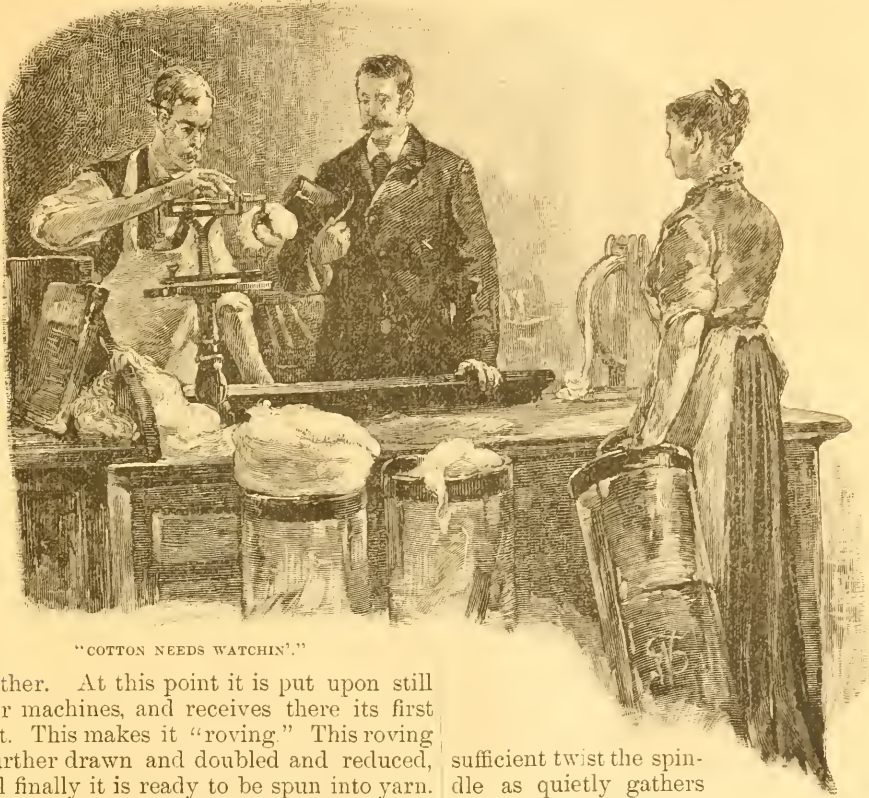
within the mills during its transformation. Beginning at the opening of the bale, we will follow it somewhat along its journey.

It is first piled in great heaps upon the floor of the "picking-room." This is the Sea Island cotton of commerce, with its inevitable impurities. A fixed quantity of this is weighed out upon the scales and spread over a fixed space upon the machine, and this relation of space to weight, begun here, is never to the end of the work lost sight of. Upon the constant observance of it depends the quality of the thread itself. The picker picks or beats out the dirt and seeds, and the purified cotton rolls out of the machine, drawn into a form very much like cotton batting. This is carried to the carding-room. The principle of the carding-machine is the same as that of the hair-brush or the curry-comb. It arranges the cleaned fibers parallel to each other. After this has brushed the knots and snarls and confusion out of the cotton, the strand is again run between sets of rollers, one set revolving faster than the other. This is "drawing," and the drawing is one of the most important parts of thread-making. If one set, for instance, turns ten times as fast as the other, the strand that passes out between them is, of course, ten times lengthened and ten times

as fine as the original. This is a "draft of ten," as it is called. The drawing may be in any ratio, and any number of strands may be run together into one at the same time that that is drawn. Five strands, for example, drawn with a draft of ten, would make a new strand half the size and ten times as long. This process of uniting strands is called doubling, and the doubling, running together, drawing down, and reuniting and redrawing are kept careful account of, so that the size of the strand and the amount of work on it are, or may be, constantly known. The operation is repeated again and again, until the original strand, if it could be followed up, would be found reduced to millionths of its original size. The doubling from first to last is about ninety million times! This means that the cotton is so worked over that it is entirely mixed, the identity of everything but the fibers themselves has disappeared, and one piece of the strand is so much like another that the two cannot be distinguished. But all this doubling is not done without interruption. After the first few drawings, the long white ribbons of cotton which, in this condition, are called "slivers," are put into another machine, which combs them over again to make certain of getting

out all foreign substances, and it also, with a sense that never misses, deliberately combs out the short fibers and allows only the long, selected and precisely suitable staples for making the best thread to pass its sentry-post. The short fibers, which are about a quarter of the whole, are not wasted, but are sold for other manufactures. The cotton which has passed the approval of this critical guardian of the future thread is still further drawn and doubled and reduced in size, until it has almost lost its inclination to hold

ing it, which is traditionally characteristic of the beast of the same name. Mule spinning is too intricate to describe, but a constant entertainment to watch. The roving, having been wound upon bobbins, is ranged in long rows of them before corresponding rows of spindles, and the two are connected by it. The frame of spindles moves quietly away and they begin to revolve, and at once the strand is drawn by the motion of the frame and twisted by the revolution of the spindles. When the length taken out has received



"COTTON NEEDS WATCHIN'."

together. At this point it is put upon still other machines, and receives there its first twist. This makes it "roving." This roving is further drawn and doubled and reduced, until finally it is ready to be spun into yarn.

Right here, a few definitions are necessary. The "sliver" is the cotton "drawn" and doubled; as soon as it has received a twist it becomes "roving," and "roving," when it is spun, becomes yarn. Spinning is the simultaneous "drawing" and twisting, and is done by the "mule." There is a fastidious philology that says the "jenny" is a vulgarism for "engine," and the "mule" a derivative of the German "mühle," mill. But there is really no doubt that the poor mechanic, Hargreaves, who invented the jenny, named it for his wife, or that the title mule means mule, and was given to the machine because of the difficulty of manag-

ing it, which is traditionally characteristic of the beast of the same name. Mule spinning is too intricate to describe, but a constant entertainment to watch. The roving, having been wound upon bobbins, is ranged in long rows of them before corresponding rows of spindles, and the two are connected by it. The frame of spindles moves quietly away and they begin to revolve, and at once the strand is drawn by the motion of the frame and twisted by the revolution of the spindles. When the length taken out has received sufficient twist the spindle as quietly gathers it in and winds it up as it goes back for a fresh start. The marvel of it all is the mathematical precision with which it begins, stops, and reverses, and the care with which it suitably varies its work each time to the needs of its case. The mule is all the while attended by a barefooted and lightly-dressed man or boy, whose business it is to unite such strands as accidentally part. He is kept as busy as a dog in a tread-mill, since the constant motion to and fro of the frames would make it necessary for him to shift position constantly to avoid being hit; but, as he flies about, he catches up

the broken strands and starts them together again with consummate skill, and as deftly as if it were the simplest thing in the world, instead of a very clever trick. On these mules the yarn is made of any size that is required. It is at Willimantic spun down to a fineness that rivals even the spider's work, and is so delicate that a single pound of it is one hundred and ninety-one miles

acts directly to make them more pliant and quiet. It was an old idea of the business that foreign mules were as necessary for fine spinning as was a foreign climate; but the Lowell, Mass., Machine Shop, having built for this company mules that are at least the



SPooling-Room.

long, or almost the distance from New York to Boston, or more than that from New York to Baltimore. In all the rooms where the twisting and spinning are done, the thermometer and hygrodeik are consulted to keep the atmosphere of even warmth and moisture, and the electricity developed in the friction is drawn off from the cotton by the moisture, and so the fibers lose the inclination to separate that they would otherwise have, and the moisture also

equals of imported machinery, has added another to the successes of American ingenuity, and with American machinery, in an American mill, spinning American cotton, we have in the thread a thoroughly American article.

The process of making the yarn has thus been hurriedly outlined. It is full of interest at every step, but a written description cannot reproduce the sight and sound of the busy rooms, with the buzz of machinery,



the rush of belts, the clatter of spindles revolving thousands of times a minute, and the men, women, and children moving to and fro waiting upon the great machines and the tiny threads that they seem almost to be playing with—a thousand people dancing attendance all their lives upon these petty strands that can hardly be seen across the room. Once made into yarn the cotton in that form is twisted into thread. In old times three strands of yarn were put together and made into spool-cotton, and three-cord cotton is still in common use. But the need of the sewing-machine for a rounder thread led to six-cord spool-cotton which is made of six strands of yarn; and this is the standard thread of to-day. Take a spool and examine it. See if the strength through each length of it is not uniform. Try if possible to find any flaws or uneven spots in it. Slide it over the finger and think of all that has been done to give it this uniformity, and de-

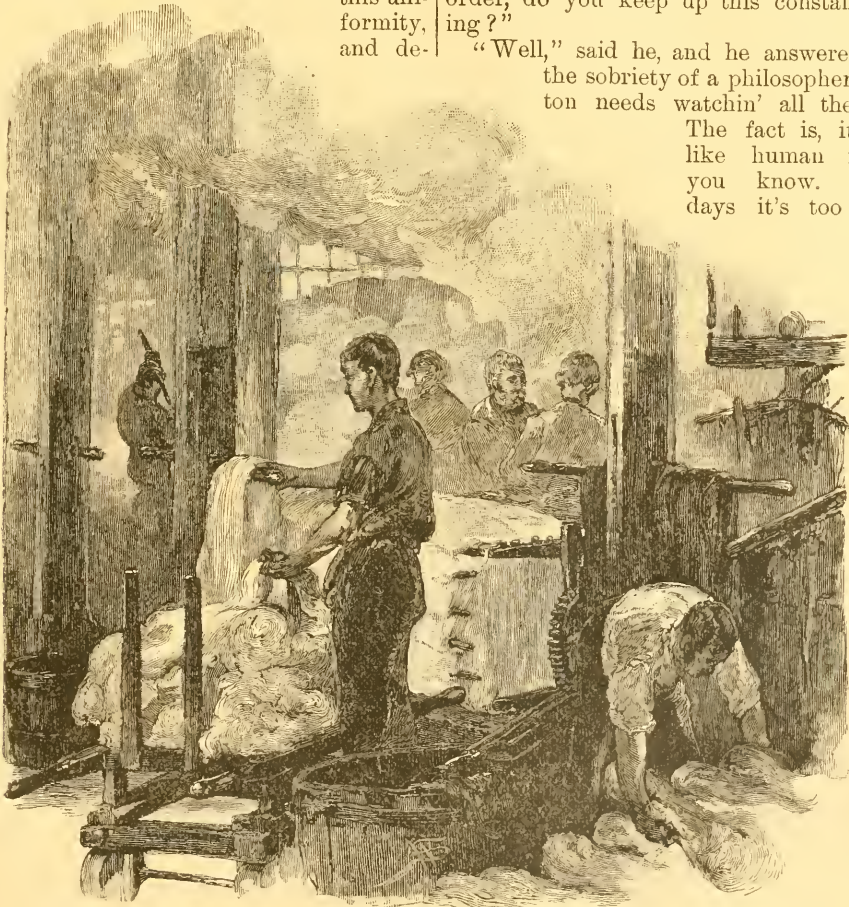
cide then whether the product is not a success, and the sufficient proof of the process.

But still it is not only proved at the end but at every step and all the time, and only that which stands every test survives to be finished. Instruments of precision are scattered all over the mills, and each room vies with the other in its devotion to absolute accuracy. We have seen that the very first start of the cotton in the picker-room is in the scales, where a certain number of pounds are spread over a certain number of yards and a ratio between length and weight is established. Everywhere this is traced and maintained, and at every fluctuation it is checked at once by the proper contrivances.

"Why," I asked the foreman of the carding-room in the main mill, as he was reeling off a sample of roving to test, "why, when you have started the stuff right in the works and have your machinery in good order, do you keep up this constant testing?"

"Well," said he, and he answered with the sobriety of a philosopher, "cotton needs watchin' all the time.

The fact is, it's just like human nature, you know. Some days it's too thick



DYE-ROOM.

and other days it's too thin. There's no dependin' on it at all, and you've all the time got to keep your eye on it and keep makin' allowance for its failin'; I don't try to account for it, I watch it."

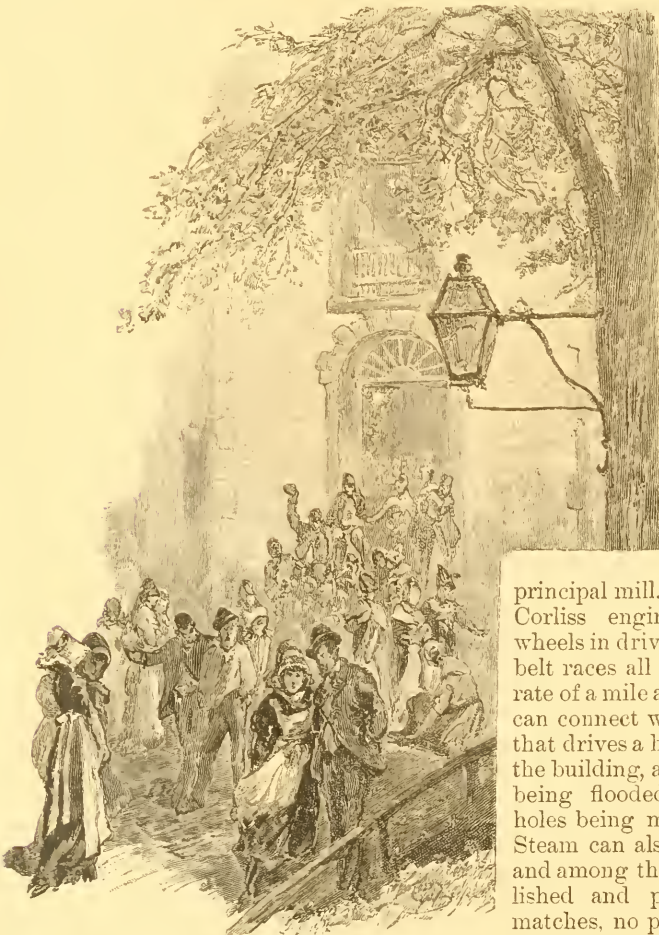
And this "watching" is the repeated trial of the success of the work. It is established by all spinners that seven thousand grains shall be a pound in cotton and that yarn of which 840 yards weigh this pound shall be number "1." Every now and then, therefore, all through the mill, a very accurately gauged reel or some similar instrument is used to measure off an even fraction of 840 yards. The measurer may be careless in taking off his sample, but that makes no matter. At exactly the right point the reel breaks the strand and calls attention to the fact by ringing its signal bell. Then this sample, say 120 yards or one-seventh of "a hank,"

is weighed on scales also gauged to show the most delicate variations. If the yarn or roving is number one and weighs one-seventh of 7,000 grains it is exactly correct, if 120 yards of No. "30," for instance, were being sampled, it should weigh one-thirtieth of one-seventh of 7,000 grains. Every time a variation appears, the cotton is made to thicken up or thin out as is needed. This testing is done repeatedly and the results are recorded in books kept for the purpose, so that the course of any of the cotton on its three weeks' cruise of three thousand miles through the factory can always be traced and faults found and corrected at once. Nothing more impresses one with the wonderful accuracy of the process than to watch one of these testings, note the exact measurement of the sample and rigidly careful weighing, and see the gravity with which

the overseer marks down the pettiest variations to the 28,000th of a pound! It all tells upon the thread, and making it correct through all its processes guarantees it correct, of course, when it is finished.

But after the thread is made the work upon it is far from ended. To prepare it for market it must be inspected, washed, bleached, dried, perhaps dyed, spooled and boxed, and the spools and boxes are made in the factory too. Besides this work and the work of the machine and repair shop which so large an establishment makes necessary, there are other objects of interest to be seen before leaving the

principal mill. A double 175-horse-power Corliss engine supplements the water-wheels in driving the main shaft. The great belt races all day around its course at the rate of a mile a minute. A single movement can connect with this power a force-pump that drives a heavy stream of water all over the building, and every room is capable of being flooded,—the door-sills and belt-holes being made water-tight by guards. Steam can also be poured into any room, and among the employés there is an established and paid fire department. No matches, no pipe, no cigar, can ever cross the threshold of the mill under any pretext.



TWELVE O'CLOCK.

Taking up again the thread of our narrative, or the narrative of our thread: after the making is complete, the skeins are marked, each with a special knot, to indicate their size, and carried first before experienced women who inspect every skein carefully, and reject at once any where a flaw appears. After it has passed this scrutiny it is washed and either bleached or dyed. The drying-machine is one of the curiosities of the dye-house. It is a great revolving iron bowl which whirls about with a surface velocity

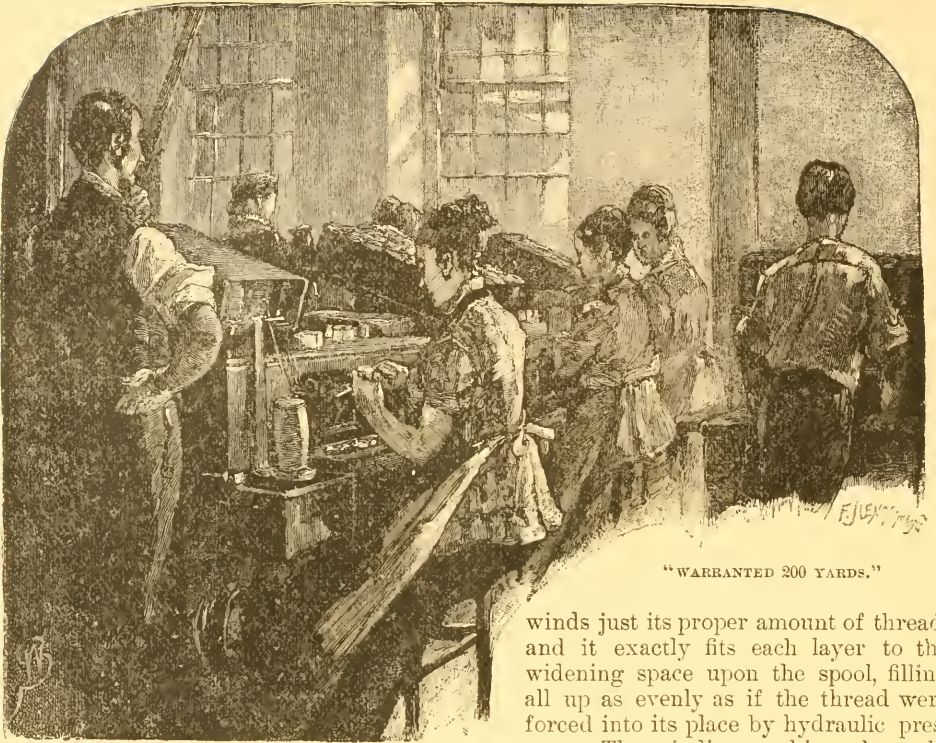
Automatic machinery prevails all through the works wherever it is possible to use it. As we said, the "mule" alone, attended by one man, does the work once done by 3,600 women. And yet with all the automatic help that exists the force of working people amounts to over one thousand persons. Each day at noon the reduced speed of the spindles shows that the



TICKETING SPOOLS.

of seven miles a minute, and the wet thread, packed around the edge of this, throws out its moisture by the centrifugal force it receives in this tremendous whirlpool. The dyeing is an especial feature of the Willimantic factory, and the dye-house with its misty atmosphere, its boiling cauldrons and its many-colored bunches of thread, is a strange and truly a stirring sight. Recently, new methods have been adopted in this department with signal success.

power is being shut off, the scramble for home begins, and out through the great doors the throng start for dinner. A large part of them are girls, and many of these work upon the thread after it is finished, in the necessary labor of fixing it for market. The box factory is an establishment by itself, where the pasteboard and the glue fly together under cunning fingers at an amazing rate. Then, before they are boxed, the spools are made up in bunches of a dozen, wrapped in paper and tied with a string. This work the girls do, and, being paid by the dozen, they rattle together about 1,300 dozen spools each a day.



"WARRANTED 200 YARDS."

What takes every one's eye first, however, in this department, as it did at Philadelphia, is the machine for ticketing the spools. One girl supplies it with sheets of printed labels, and another feeds it with spools; it does all the rest for itself. Provided with the labels, it cuts out, pastes, and fastens the proper mark for each end of the spool, and prepares a hundred spools a minute. Formerly, the labels were cut out by hand with a stamp, and then affixed to the spools by the aid of the tongue. It was a dry, fatiguing business, and not especially attractive. Licking spools was not even so exhilarating as school-teaching, and though a triumph of industry, perhaps, it still was not a conquest to boast of. But now the machine does the work of many girls, and its health never suffers. It is a machine without a tongue. The spools, each previously covered by an almost equally adroit machine with exactly 200 yards of thread, slide down their appointed path to this spot, where they are duly marked and labeled.

The winding-machine, which puts the "Warranted 200 yards" upon each spool, does its work with marvelous precision. It

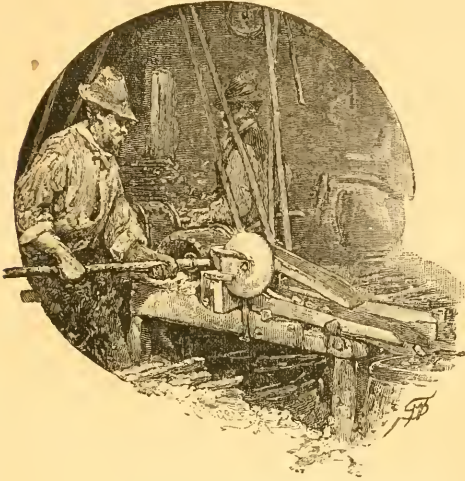
winds just its proper amount of thread, and it exactly fits each layer to the widening space upon the spool, filling all up as evenly as if the thread were forced into its place by hydraulic pressure. The winding-machine, the ticketing-machine, and the automatic spool-making machine, inventions belonging to the Willimantic Company, are so essential to the thread business that the privilege of using them is rented by other manufacturers, and they yield a handsome revenue in this way.

Everybody knows the sizes of thread. Every seamstress knows whether she wants No. 30 or 60 or 120, and knows, when she hears the number, about what is the size of the strand alluded to; but how the numbers happen to be what they are, and just what they mean, not one person in a thousand knows. It is a simple matter to explain. The standard of measurement is the same already recited. When 840 yards of yarn weigh 7,000 grains (a cotton pound), the yarn is No. 1; if 1,680 yards weigh a pound, it will be No. 2 yarn. For No. 50 yarn it



TICKETS FOR THREAD.

would take  $50 \times 840$  yards to weigh a pound. This is the whole of the yarn measurement. Thread measurement rests on it. The early thread was three-cord, and the thread took



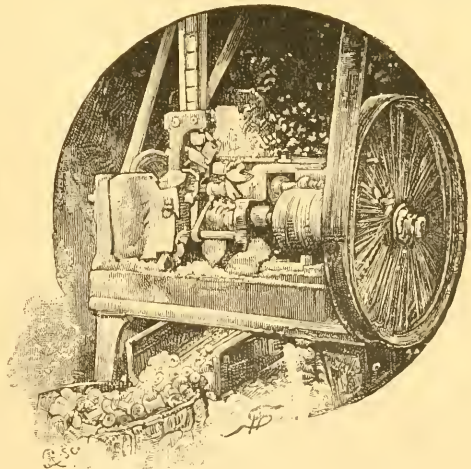
SPOOL ROUGHING MACHINE.

its number from the number of the yarn it was made of. No. 60 yarn made No. 60 thread, though in point of fact the actual caliber of No. 60 thread would equal No. 20 yarn, being three 60 strands. When the sewing-machine came into market as the great consumer, unreasoning in its work and inexorable in its demands for mechanical accuracy, six-cord cotton had to be made, as a smoother, rounder product. As thread numbers were already established, they were not altered for the new article, and No. 60 six-cord and No. 60 three-cord are identical in size as well as number. To effect this, the six-cord has to be made of a yarn twice as fine as the three-cord demands. The No. 60 six-cord would be six strands of No. 120 yarn. To summarize: yarn gets its number from the arbitrary formula that 840 yards weigh 7,000 grains. Three-cord spool-cotton is the same number as the yarn it is made of. Six-cord spool-cotton is made of yarn that is double its number.

Up to No. 60, this is true of the foreign thread also; but, beginning with this number, the foreign makers diminish the ratio in the six cord, thus 60 is made of 110 yarn, instead of 120, 70 of 120, and so on, 100 being made of 150 yarn. In the Willimantic thread the original ratio is maintained all the way, and the size 100 is made of No. 200 yarn. The careful selection of long staples makes these numbers fully equal in strength to the parallel numbers of the

coarser thread of other makers, and the traditional mathematical ratio and exact accuracy are thus positively maintained. One of the products of the company, the "Reid's Thread," named from Mr. J. M. Reid, the superintendent of the dyeing department, is a general substitute for silk and linen thread, to which in its peculiar manufacture it is made to bear a very close resemblance. It has proved so serviceable because of the especial toughness of the cotton, which has been already alluded to, that it has met a very general demand, and already a counterfeit of it is being extensively sold as "French spool cotton," while the original is purely an American invention.

The spools that the thread is wound on are made of white birch. Years ago the "birch lot" became the by-word among farmers for worthlessness in New England. It still is so in many places, but not about Willimantic. There it is as good as any land, and there is a sure demand for its yield at the mills, where about 3,000 cords are made into spools every year. In the fall, when most of the year's supply is bought, the procession of teams, from most ordinary to nondescript, is one of the sights of Willimantic, as they come winding in from all the surrounding country, with their great loads of white birch piled up behind all the live stock of the farm that has locomotive ability. A horse, a mule, and a cow will often haul together at the cart. The factory where, twen-

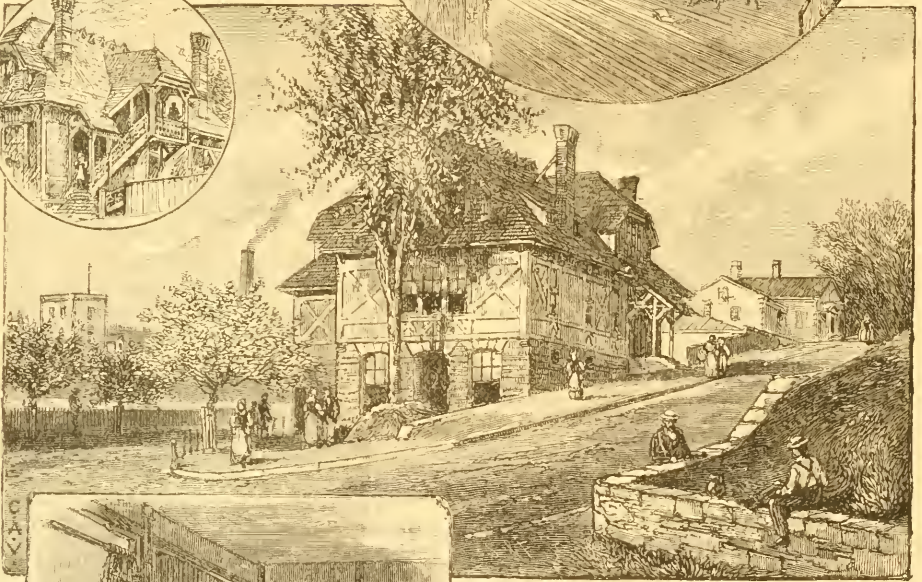
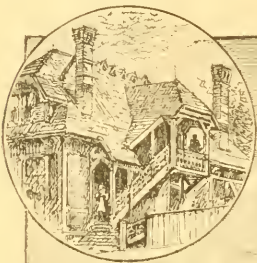
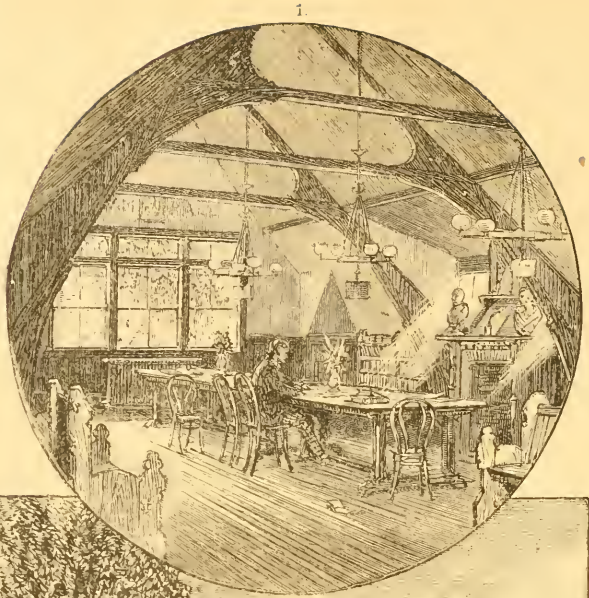


"FASTER THAN ONE A SECOND."

ty-five years ago, thread-making was begun on what was thought a large scale, is now entirely given up to making spools, and the sawdust and shavings go far to keep up the

fires in all the mills. The spool-making machinery works almost like magic. One operation turns down the wood to proper size, bores the hole in it, and cuts it off, and another takes this cylindrical block, and with a whirl and a puff of shaving, trims it down to be a complete spool, and the spools roll into barrels faster than one every second, and all alike.

As simple a thing as thread seems to be, the Willimantic Company makes 1,200 different kinds, and it takes 10,000 dozen spools to hold each day's product. There are 200 yards to a



THE COMPANY'S BUILDING.

1, Dunham Hall (the library); 2, to the library; 3, "Modern Gothic"; 4, decorative art.

spool, and a little calculation will show that this means that, simply at the Willimantic mills, 13,600 miles of thread are made each day, or about 4,100,000 miles a year. This means more than 1,200 miles of thread an hour, or 20 miles every minute. And, as the combined work of 1,000 employes makes 13,600 miles of thread, even division demonstrates that the work of each is equivalent to 13½ miles of thread daily. Yet it is evidently not an exhausting life. There is a look of health about the people and of content about the place.

The company has lately added much to the comfort and beauty of the place by putting up, opposite the main mill, a graceful and

greatest yarn in Windham is that about the "frog-pond scare." A few rods east of Windham proper is a pond of moderate size, out



WINDHAM FROG-POND.

attractive public building. It is of unpainted brick, in the modern Gothic style of architecture. On the ground floor are a grocery and household provision store and a meat-market, and a broad stairway leads to the dry goods and millinery and boot and shoe departments on the next floor. The whole is fitted up in admirable taste. On the third floor is Dunham Hall, a free reading-room, with a free circulating library, established and named in memory of the late Austin Dunham of Hartford, one of the founders of the company, and for years its President, who was one of the foremost men of Hartford in the promotion of industrial and philanthropic objects during his life. The library contains about 1600 volumes, more than half of which are in constant circulation at the homes of the operatives. The privileges of the place are thoroughly appreciated. The well-clothed, comfortable, healthy-looking people of the factories have not a dissatisfied appearance. In the twenty-five years of the company's existence there has never yet been a general reduction of wages.

The making of spool-cotton is only twenty-five years old in Willimantic; but Windham, of which Willimantic is a borough, more than a hundred years ago offered bounties for the best linen thread, and has a traditional reputation for spinning yarns. The

of which flows a small stream. It is related that one night in July, 1758, during the war, when the people slept rather uneasily for fear of attack, mysterious cries came down out of the clouds for "Colonel Dyer" and "Elderkin, too" (two prominent men of the place). The calls were heard, and the people gathered, and finally the town reached a pitch of terror that only daylight could relieve. It did relieve it, and it showed the shores of the pond green with the bodies of dead frogs. Some said there had been a frog battle; others that the frogs had had a sudden plague, and had sung as they died, like their colleagues the swans; others that the pond had been evacuated by the frogs, under some unaccountable freak, and that they had marched through the town, threading their way to Willimantic River. Some take old Samuel Peters's account of the affair, published as a specimen lie in SCRIBNER for June, and, showing its falsity, argue the falsity of the whole story. Young people joke on the matter now; but it once admitted of only sober consideration at Windham. The tradition was taken up by the Windham bank managers and their bills that circulated for years before the national banking system was established bore the mystic figures of a live frog and a dead one—the two sides of that night's terrible combat, or one side of the variegated anecdote.

But if the Windham yarn of two hundred years ago was a myth, the Willimantic yarn of to-day is a fact, a slender one but consistent. Out of the yarn is made the thread. Perhaps it is not necessary to speculate upon what we should do without thread. Dr. Livingstone found a people who built mud baskets on their heads, and all that they wore was a bit of cotton cloth, stowed away in this basket. Idle tradition tells of an eastern monarch with a favorite costume of postage stamps. We might not be absolutely driven to either of these resorts, if suddenly deprived of

this useful product, yet it is well enough to remember that the first distinction between man and the inferior animals is his desire for dress. Thread, to-day, is what holds his dress upon him; and so, in a sense it is by a thread that we are lifted above the rest of creation. It at least, under the circumstances, is entitled to our respectful consideration, and possibly the story of what it is, and how it is made, will help to create more of an interest in what is commonly "nothing but a spool of thread."



"ELDERKIN, TOO!"



# CONNECTICUT SUCCESS IN COTTON-SPINNING.

*From Hartford Courant, July 30, 1879.*

AN interesting discussion as to the comparative success of Great Britain and America in spinning cotton has lately been going on in the English trade journal *Cotton*, the London *Times*, and the New York *Herald*. Mr. B. F. Nourse, of Boston, the well-known statistician and expert, a while ago replied to a series of questions regarding our manufactures that were sent to him by David A. Wells, who had received them from England. The *Cotton* took exceptions to some of Mr. Nourse's answers, especially to one where he says we spin finer thread here than is spun by machinery in Great Britain. Mr. Nourse has written another letter proving his statements, which was published in the New York *Herald*, the *Cotton* having come to an untimely end and suspended since it expressed its doubts of American superiority. Mr. Nourse, quoting Mr. Edward Atkinson, cites the Willimantic company of this city as spinning finer than any English concern, and he gives the following interesting details which are fresh evidences of the triumph of our Connecticut industry. He writes (to the *Cotton*):—

To the question, "Do American manufacturers produce successfully the finest qualities of cotton cloths, or do they still confine their attention to low and medium qualities?" my answer (in part) was, "American manufacturers do not produce the finest qualities of cotton cloth, such as muslins, fine cambries, etc., not because they cannot, (finer thread having been spun here than any ever produced by machinery in England), but because the available markets for such cloths would not sustain a manufacture of sufficient magnitude to be profitable." The words in the parenthesis above quoted provoke your remark, "We ought not to have bare assertion here." They were inserted after my manuscript had been finished, at the instance of Mr. Edward Atkinson, for many years a prominent manufacturer. Their statement may have been indiscreet. Let us see how far it is sustained.

Mr. Atkinson writes to me under date May 20th, as follows:—"I am informed that a statement made by me to you has been questioned, to wit: 'finer thread having been spun here than any ever produced by machinery in England.' The three-cord No. 550 thread produced by the Willimantic company, suitable to be used on a sewing machine, was my warrant for this assertion. At the time I also supposed that the same company, in spinning No. 1,100 single yarn on a mule in the open air of their factory, had accomplished finer yarn spinning than had been reached in Great Britain; but I have since learned that this was an error, a much finer number having been spun there. But it was made on a small mule, specially constructed, and operated under a glass case. Such excessively fine numbers have, of course, no commercial value. More important is the success of the Willimantic company in spinning No. 120 for regular commercial uses on a ring spinning frame. This success and our recent progress in fine work in several of the mills promised good results, as the work done on the ring frame is cheaper and stronger than that of the mule."

Before receiving Mr. Atkinson's letter I had applied

for a statement of facts to Mr. William E. Barrows, the treasurer (and examiner) of the Willimantic Linen company, whose large mills for the production of sewing thread (now wholly of cotton) are in the state of Connecticut. From this letter I condense the following statement:—

1. Our fine numbers of thread are made for use on sewing machines. They are three and six ply, made from Nos. 300, 400, 500, and 550. The finest numbers are used for pillow lace making, and judging from the demand, give good satisfaction.

2. The finest number of thread regularly sent to foreign markets by this company is No. 100 six-cord, made from 200 yarn.

3. The finest yarn we have spun on the American ring spinning frame (built by the Lowell Machine shop, Lowell, Mass.), with the Sawyer spindle, is No. 320. This was experimental, the yarn not used for regular thread. We regularly spin on ring frames No. 120 yarn for No. 60 six-cord sewing-cotton.

4. We have no climatic or atmospheric difficulties. The yarns sent are the best proof that we have no trouble.

5. We do prefer American machinery. The self-acting mules, built by the Lowell Machine shop, give less trouble than foreign built mules in the same numbers, 100's to 140's.

6. All our overseers and more than one-third of our work people are Americans—a sufficient guarantee of their intelligence.

7. The most profitable numbers for us to spin are 120's to 140's.

8. See the accompanying certificates of the comparative merit of our sewing cottons, from the expositions of Paris and Philadelphia, and from American and Maryland institutes, and the reports (1876) of M. Louis Chatelet.

9. We do not import any machinery for better work or cheaper production. Combers and hand-mules are not yet made in this country, and we are obliged to import these machines.

10. I believe our extra fine numbers—400's, 500's, and 550's—are finer threads than any ever produced by machinery in England. All of these fine numbers have been tested on power-sewing machines at a speed of eleven hundred stitches per minute, giving satisfaction. Experimentally we have spun No. 1,100 on a hand-mule of 640 spindles, 60 "stretch," 1½ gauge. Our usual fine work is 140's to 200's on mules, and 80's to 120's on ring frames.

I send you some samples, among them are Nos. 300 and 400 hank roving, made on a fly frame built by the City Machine company of Providence, R. I.

With the letter of Mr. Barrows came a package of samples from the Willimantic mills, which I forward to Manchester for your inspection. The package contains:—

One cop each of Nos. 100, 120, 140, 160, 275, 375, and 400 mule yarn.

One bobbin each of Nos. 90 and 120 frame yarn.  
Sample of No. 550 yarn; samples of each Nos. 100, 200, 300, and 400 hank roving.

One spool each of Nos. 250, 350, 450, and 550 three cord thread.

One spool of No. 125 six-cord thread; and  
One spool (2,400 yards) of No. 60 six-cord thread.

**WILLIMANTIC**  
**THE BEST THREAD FOR SEWING MACHINES**  
**WILLIMANTIC**

Trade Mark Patented.











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